SNOW SAMPLING SURVEY
in the vicinity of
KIMBERLY-CLARK OF CANADA LIMITED
and
WELDWOOD OF CANADA LIMITED,
LONGLAC

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INTRODUCTION

Weldwood of Canada Limited operates a waferboard and plywood mill just south of the Township of Longlac. Kimberly-Clark of Canada Limited has a sawmill nearby. Both companies incinerate waste wood, wood fines and bark in "teepee" burners. Smoke discharged from these burners has led to complaints from area residents of odours and impaired visibility. In response, the Industrial Abatement Section of the Ministry's Thunder Bay District Office requested an air quality study near these two industries. Since the contaminants of concern were mainly in the form of particulate matter, we decided to obtain our data through a snow sampling survey. This work was conducted in February, 1983.

METHODS

Duplicate samples of snow were collected on February 9, 1983 from 15 sites near the teepee burners (Figure 1) and from two control sites remote from the study area. Core samples of the complete snow profile were obtained following standard Ministry sampling procedures (1). Snow meltwater samples were submitted to the Ministry's Thunder Bay laboratory for determination of conductivity, suspended solids and pH. Analysis of carbon and tannins, which are potential tracers for wood waste, was performed at the Ministry's Toronto laboratory.

RESULTS AND DISCUSSIONS

Results from the survey are summarized in Table 1. Concentrations of carbon, suspended solids, conductivity, and pH were elevated near the teepee burners and decreased with increasing distance from these emission sources. Highest levels of these parameters occurred at sites 9, 10, 11, and 12, near Weldwood's teepee burner, and at sites 1, 3, 4, 5 and 6 near

Kimberly-Clark's burner. Levels of tannins were slightly elevated in these two areas. Contaminant concentrations in residential areas, while lower than those near the burners, were still well above background. Trace to heavy quantities of wood fines or charred wood particles were noted in snow or snow meltwater from all sites except sites 8, 14, and the controls. Some of this material was deposited as far as 1,100 metres north of the teepee burners. Microscopic examination identified these particles as primarily wood fibres, with minor amounts of partially combusted wood and bark. These contaminants were distributed in a pattern generally similar to that shown in Figure 2 for suspended solids.

Contaminant levels were slightly lower near Kimberly-Clark's teepee burner than those around Weldwood, probably because Kimberly-Clark's burner was in use only from January 14, 1983, 27 days before our survey. In contrast, Weldwood's burner had been operating continuously during the winter. Assuming an average snow depth of 44 centimetres, we estimate that the combined fallout of particulate matter emitted from the two burners (measured as suspended solids) was about 7,700 kilograms in the snow pack within the 30 mg/ℓ isopleth zone shown in Figure 2. Within this 210-hectare area, particulate carbon accounted for around 58% of the total fallout. The deposition rate of suspended solids was about 5-12 g/m^2 (grams per square metre) near Weldwood, about 3-5 g/m^2 near Kimberly-Clark, and varied from 1 to 4 g/m^2 in residential areas. The disposition rates at control sites were less than 0.2 g/m^2.

CONCLUSIONS

A snow sampling survey at Longlac in February, 1983, demonstrated that teepee burners operated by Kimberly-Clark and Weldwood are significant sources of airborne particulate carbon and wood fines. The levels of these contaminants in snow were highest near the burners and decreased as distance from these sources

increased. Fallout levels in residential areas were above normal, but not as high as those near the burners. These findings, together with observation of visible emissions, indicate that the continued use of the burners may be a source of discomfort and a nuisance to nearby residents.

To obtain long-term air quality data, the Ministry has established a small monitoring network in Longlac to measure dustfall and suspended particulate matter for a period of at least one year. These data will assist in assessing the possible need for a program to control emissions from the teepee burners.

REFERENCES

1. Ontario Ministry of the Environment. 1983. Field investigation procedures manual, Phytotoxicology Section, Air Resources Branch.

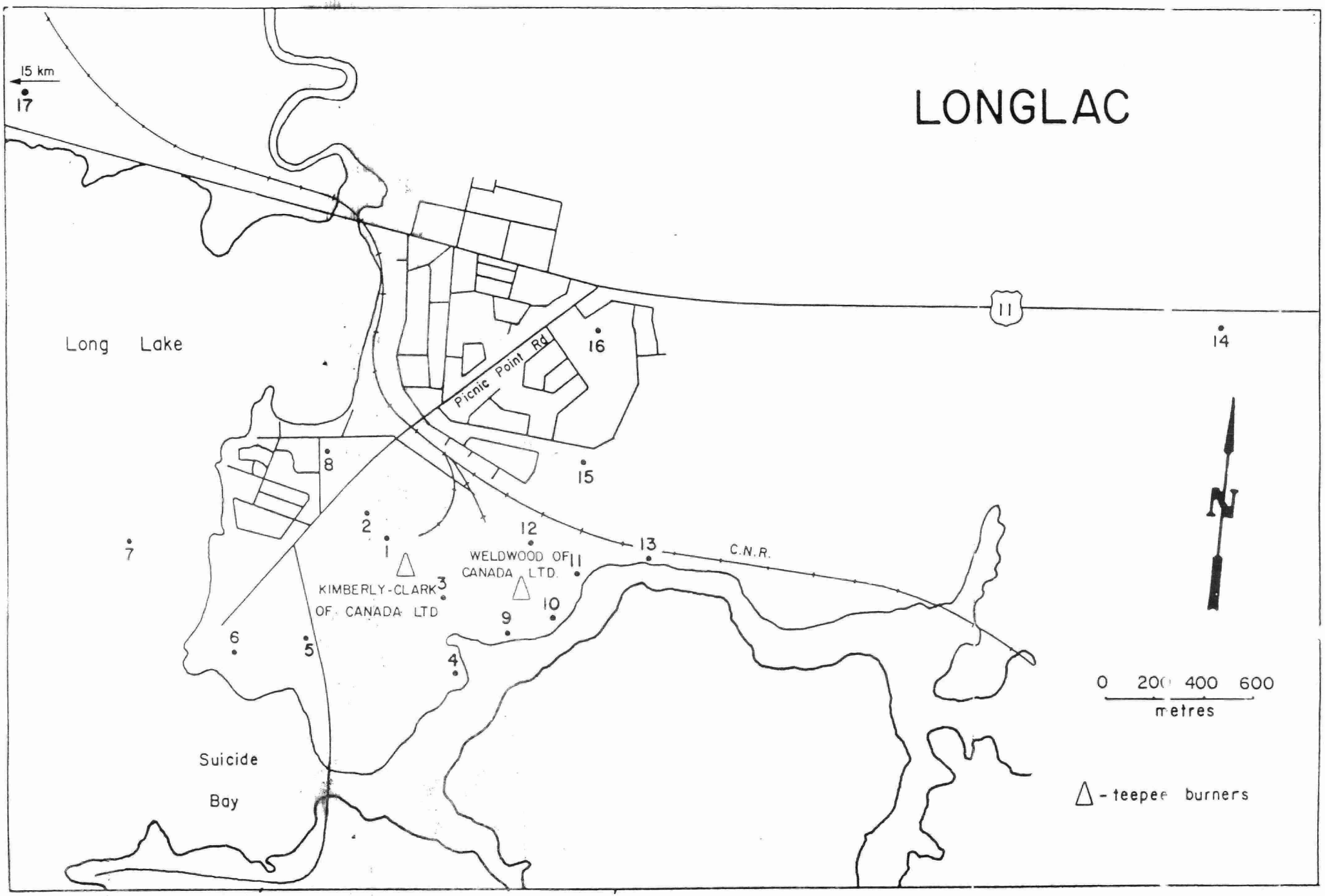

Figure 1. Snow sampling sites, Longlac, February, 1983.

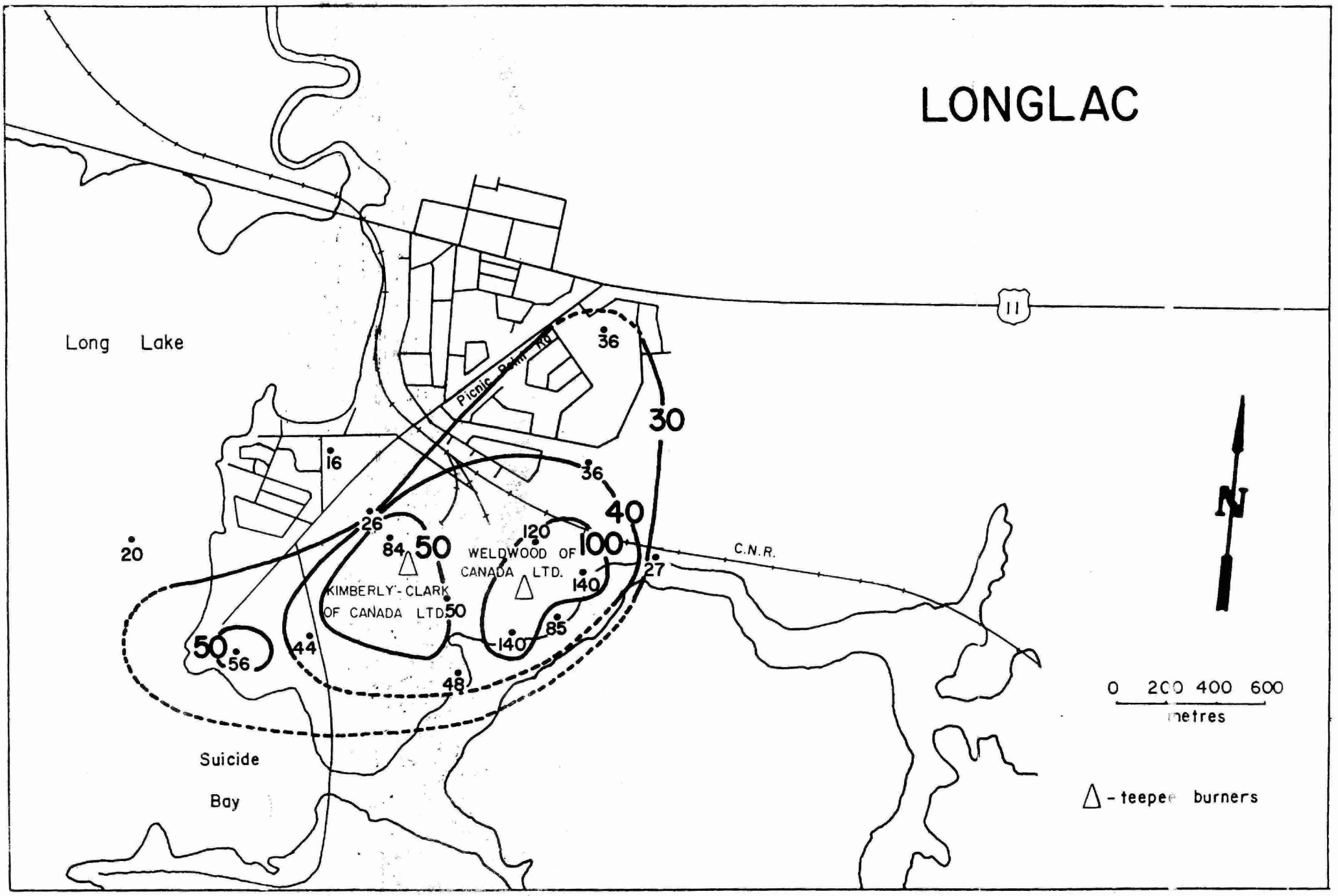

Figure 2. Levels of suspended solids (mg/l) in snow, Longlac, 1983.

TABLE 1. Levels of carbon, tannins, and suspended solids (mg/ℓ), conductivity (μmhos/cm), and pH in snowmelt water, Longlac, 1983.

Site	Carbon			Tannins	Suspended Solids	Conductivity	pH
	Particulate	Dissolved Organic	Dissolved Inorganic				
1	64	2.8	1.8	3	84	16	6.4
2	15	0.8	0.8	1	26	12	6.3
3	34	2.0	2.4	2	50	25	7.6
4	36	2.5	3.4	2	48	28	8.3
5	31	1.6	2.2	2	44	21	7.0
6	29	2.5	2.4	2	56	22	6.9
7	12	1.4	<0.2	1	20	10	5.5
8	8	0.8	1.0	0	16	13	6.4
9	68	8.9	6.6	2	140	84	10.0
10	49	2.7	5.1	2	85	38	8.7
11	76	3.2	6.8	2	140	46	9.0
12	63	3.6	7.2	2	120	51	9.1
13	16	1.4	2.1	1	27	23	7.4
15	21	1.7	2.4	1	36	24	6.8
16	20	1.2	1.8	1	36	20	6.9
Controls[a]	<1	0.3	<0.2	0	3	8	5.2

[a]Averages of stations 14 and 17.

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